Appendix

Washington State Air Quality: A Status Report

Though Washington State continues to grapple with population growth and related air pollution problems, many areas showed an improvement in air quality during 1995. These improvements are expected to continue, based on trends from data collected over the last 25 years. Below is a look at current, historical and future trends in air quality in Washington State and what's being done to prevent and control air pollution

How do we measure progress in air quality?

Ecology and seven local air pollution control authorities around the state monitor for three pollutants which are of most concern in Washington: carbon monoxide, ozone and very small particulate matter (PM_{10}). Ongoing monitoring provides data which help determine the status of our air quality, identify the areas with the worst air pollution, identify where health risks may exist, and determine if strategies for controlling pollutants in various areas of the state are working.

Thirteen areas in Washington where air quality is monitored are "nonattainment areas" – areas designated by the U.S. Environmental Protection Agency as not meeting the federal health-based standards for one or more of these pollutants. The population, geography, and meteorology of each of these areas influence what air pollutant is a problem, what the *major sources are*, and what strategies are likely to succeed in controlling pollution. For example, population and the resulting traffic are the primary sources of carbon monoxide pollution in the Puget Sound area, while windblown dust is a major contributor to the PM_{10} problem in eastern Washington.

What are the health impacts?

Health impacts for individuals exposed to carbon monoxide, ozone and PM_{10} range from minimal effects to short-term reduction in lung functions to cancer and respiratory problems. Air pollution has the greatest impact on individuals experiencing cardiovascular or respiratory disease, children and the elderly in addition to its health impacts, air pollution causes problems with visibility, odors and deposition.

How is data collected?

Ecology's air monitoring network is established with the intent of finding out how bad the air is in areas of the state with the worst air quality. The number and location of air monitors may change each year based on changing conditions in an area. This is done to ensure that data are collected in areas of the state with high levels of pollutants. The highest pollutant levels in monitored areas were compared over time to determine air quality trends in each area.

What progress have we made?

Our progress in reducing air pollution is clear Data from air quality monitors show that levels of carbon monoxide, ozone and PM_{10} are improving markedly in many areas across the state. Of the 13 nonattainment areas, 11 are now monitoring air quality that meets federal standards. The Spokane PM_{10} area and the Spokane carbon monoxide area are the two lingering problem areas.

Todays strategies for addressing air pollution are significantly different from some of the first strategies implemented 25 years ago. At that time, the main focus of air pollution controls was industry. Through the 1970s and '80s, air pollution from industry was reduced by more than 90 percent due to increased awareness, regulation and technological advances. As businesses took steps to prevent and reduce their emissions of air pollutants, it became clear that the major sources of air pollution were shifting to individuals and their lifestyle choices. Current control strategies and our progress in cleaning up the air are summarized below:

- Carbon **monoxide:** Carbon monoxide has been one of our state's biggest problems in terms of air pollution. In 1977, for example, carbon monoxide levels exceeded the standard 403 times in Spokane alone. In 1995, carbon monoxide levels exceeded the standard 5 times – and continued progress is expected.

  Data collected from 1975 onward show a clear and dramatic downward trend in carbon monoxide pollution, due in part to programs such as vehicle emission inspection, oxygenated gasoline andcommute trip reduction, as well as tighter new car performance standards.

- **Ozone:** Since 1975, ozone levels have remained fairly consistent – hovering very close to the federal standard in spite of population increases and the accompanying increase in motor vehicle use. At its worst in 1978, ozone exceeded the standard 23 times in the Puget Sound area. In 1995, ozone levels did not exceed the standard. Progress in reducing ozone pollution is due in part to vehicle emission inspection, gasoline vapor recovery and federal motor vehicle and motor vehicle fuel programs.

  However, because ozone is weather-related (hot, sunny days are required for ozone to be formed from a combination of hydrocarbons and nitrogen oxides), ozone trends are erratic.

- **PM_{10}:** In 1985, PM_{10} levels exceeded the standard 43 times, with observations above the standard occurring in Puget Sound, Yakima and Spokane. In contrast, PM_{10} levels did not exceed the standard in 1995. However, trends show a continuing PM_{10} problem in Spokane and the Tri-Cities and Wallula areas. PM_{10} remains a pollutant of concern here due largely to wood stove use and outdoor burning in the central Washington area, and to the unpredictability and lack of controls for windblown dust in eastern Washington. Despite this, PM_{10} levels are on the downturn. Strategies being implemented to address the problem include programs to limit wood stove use and outdoor burning, road paving, and controls on major industrial sources.

The future: Challenges ahead

Continuing growth in Washington means more development, more people . . . and more potential for pollution. Largely due to population growth and increased use of cars, the actions and choices of individuals have much more impact on air quality to&y than ever before. Today, the leading source of air pollution is motor vehicles, followed by wood stoves, industry and outdoor burning. In the face of these challenges, our goal for the future is to maintain acceptable levels of air quality. As carbon monoxide, ozone and PM_{10} are brought under control, we will begin investigating and addressing any remaining pollutants that could pose threats to human health and the environment.

For more information

For more information on air quality trends and what you can do to prevent and control air pollution, please contact Pat Bailey Norman at the Department of Ecology at (360) 407-6841.

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If you have special accommodation needs or require this document in alternative format, please contact Pat Bailey Norman at (360) 407-6841 (voice) or (360) 407-6006 (TDD only).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Redesignating Nonattainment Areas

Background

Areas that have experienced persistent air quality problems have been designated by the U.S. Environmental Protection Agency (EPA) as nonattainment areas. Each nonattainment area is declared for a specific pollutant. Nonattainment areas for different pollutants may overlap each other or share common boundaries. The federal Clean Air Act requires additional air pollution controls in these areas.

Several of the nonattainment areas in Washington now appear to be meeting the federal health-based standards for outdoor air quality. This apparent compliance with the federal standards does not automatically bring an area's nonattainment designation to an end. The federal Clean Air Act requires the state to follow an extensive process to prove that the nonattainment designation should be removed. The basic federal requirements are:

- The national outdoor air quality standards have been attained.
- EPA has approved the State Implementation Plan for bringing the area into attainment.
- The state must prove to EPA that the improved air quality is due to permanent and enforceable reductions in pollutant emissions.
- EPA has approved a state/local maintenance plan, including a contingency plan, that will keep the area's air quality within the standards.

Meeting the standards

To be considered for redesignation, a nonattainment area must not violate the following national outdoor air quality standards:

- **Fine particulate matter and ground level ozone:** No more than an average of one exceedence of the standard per year in a consecutive three-year period.
- **Carbon monoxide:** No more than one exceedence of the standard each year during a two year period. (No averaging is allowed; there can't be two exceedences one year and none the next.)

These data must be the result of actual monitoring. Ecology must demonstrate the monitoring equipment was located in places likely to experience the highest concentrations of the pollutant. EPA also requires a computer modelling analysis to show that monitoring did occur in high concentration areas and to support Ecology's case that the standard has been met.

The nonattainment area plan

Ecology must complete and obtain EPA approval of the State Implementation Plan for the nonattainment area. Ecology must complete the federal planning process before fully addressing other redesignation requirements.

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"Real" pollution reductions

Ecology must prove that the air quality improvements are permanent and *enforceable. They* must not be attributable to unusually favorable weather conditions or such factors as economic downturns that resulted in less traffic and industrial activity.

Maintenance plan

For an area to be redesignated, EPA must approve **a** maintenance plan. Ecology must outline the measures that will be used to keep the area's air quality within the federal standard for 10 years after redesignation. Circumstances will dictate whether fewer, the same or additional control measures will be required. The plan must describe measures that will be taken to correct violations of the air quality standards, if they occur. Ecology may submit the maintenance plan at the same time it petitions for redesignation.

Other requirements

Inventory

Ecology and local air quality agencies must prepare an inventory showing the sources of emissions and how much pollution they generate. Sources are things such as vehicles, wood stoves and commercial or industrial facilities that generate air pollution. Ecology must identify the maximum amount of emissions that can be allowed without violating the air quality standards.

Maintenance demonstration

Using a computer model, Ecology must demonstrate to EPA's satisfaction that the maintenance plan will keep air quality within the federal standards for 10 years, even if the number of pollution sources increases.

Monitoring

The state must continue its monitoring program. Ecology must submit a monitoring plan that will effectively show whether the federal standards are being maintained. The plan must allow for special studies in case traffic or other air pollution source patterns change. These studies could lead to new permanent monitoring sites if high pollution concentration areas change.

Verification

Ecology must submit its plan for verifying that the air quality standards are being maintained and enforced. This verification scheme must keep track of the maintenance plan. This can include updates to the inventory or the assumptions and inputs used for modelling.

Conclusion

The federal procedure for removing an area's nonattainment designation is detailed and extensive. The task of fully meeting these requirements and obtaining redesignation can be expected to take approximately two years for each area. Ecology and the local air quality agencies are working to gain redesignation in all areas that are meeting the outdoor air quality standards.

For more information

Doug Schneider (360) 407-6874
Unit Supervisor for nonattainment area planning

If you have special accommodation needs or require this document in alternative format, please contact Tami Dahlgren, Department of Ecology, (360) 407-6830 (voice); or (360) 407-6006 (TDD only).

Sources of Information about Air Pollution in Washington State

1.	**Olympic Air Pollution Control Authority** *(Clallam, Grays Harbor, Jefferson, Mason, Pacific, Thurston Counties)* 909 Sleater-Kinney Road SE, Suite 1 Lacey WA 98503-1128 Charles E. Peace, Executive Director *Telephone:* (360) 438-8768 or 1-800-422-5623 *Fax:* (360) 491-6308; *E-mail:* oapca@wln.com Internet: http://www.wln.com/~oapca	**2.**	**Department of Ecology Northwest Regional Office** *(San Juan County)* 3190-160th Avenue SE, Bellevue, WA 98008-5452 *Telephone:* (425) 649-7000 *Fax:* (425) 649-7098, *TDD:* (425) 649-4259
3.	**Northwest Air Pollution Authority** *(Island, Skagit, Whatcom Counties)* 1600 South Second Street Mount Vernon, WA 98273-5202 Terry Nyman, Air Pollution Control Officer *Telephone:* (360) 428-1617 *Telephone:* 1-800-622-4627 (*Island & Whatcom*) *Fax:* (360) 428-1620; *E-mail:* nwapa@pacificrim.net Internet: http://www.pacificrim.net/~nwapa	**4.**	**Puget Sound Air Pollution Control Agency** *(King, Kitsap, Pierce, Snohomish Counties)* 110 Union Street, Suite 500 Seattle, WA 98101-2038 Dennis J. McLerran, Air Pollution Control Officer *Telephone:* (206) 343-8800 or 1-800-552-3565 1-800-595-4341 *(Burn Ban Recording)* *Fax:* (206) 343-7522; *E-mail:* psapca@wolfenet.com Internet: http://www.psapca.org
5.	**Southwest Air Pollution Control Authority** *(Clark, Cowlitz, Lewis, Skamania, Wahkiakum Counties)* 1308 NE 134th Street Vancouver, WA 98685-2747 Robert D. Elliott, Executive Director *Telephone:* (360) 574-3058 or 1-800-633-0709 *Fax:* (360) 576-0925; *E-mail:* swapca@worldaccessnet.com Internet: http://www.swapca.org	**6.**	**Department of Ecology Central Regional Office** *(Chelan, Douglas, Kittitas, Klickitat, Okanogan Counties)* 15 West Yakima Avenue, Suite #200 Yakima, WA 98902-3401 *Telephone:* (509) 575-2490 *Fax:* (509) 575-2809, *TDD:* (509) 454-7673
7.	**Yakima Regional Clean Air Authority** 6 South 2nd Street, Room 1016 Yakima, WA 98901 Les Ornelas, Director *Telephone:* (509) 574-1410 or 1-800-540-6950 *Fax:* (509) 574-1411; *E-mail:* les@yrcaa.org (please also cc: tom@yrcaa.org and gar@yrcaa.org on e-mail inquiries)	**8.**	**Department of Ecology Eastern Regional Office** *(Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, Whitman Counties)* 4601 N. Monroe Street, Suite 202 Spokane, WA 99205-1295 *Telephone:* (509) 456-2926 *Fax:* (509) 456-6175, *TDD:* (509) 458-2055
9.	**Spokane County Air Pollution Control Authority** W 1101 College Ave, Suite 403 Spokane, WA 99201 Eric Skelton, Director *Telephone:* (509) 456-4727 *Fax:* (509) 459-6828; *E-mail:* scapca@iea.com	**10.**	**Benton County Clean Air Authority** 650 George Washington Way, Richland, WA 99352 Dave Lauer, Director Telephone: (509) 943-3396 Fax: (509) 943-0505 or 943-2232; *E-mail:* bccaa@3-cities.com Telephone: (509) 946-4489 *(Burn Ban Recording)* Internet: http://www.cbvcp.com/bccaa

Other Sources of Information about Air Pollution in Washington State

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Pulp Mills, Aluminum Smelters
Department of Ecology - Industrial Section
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Department of Ecology Southwest Regional Office
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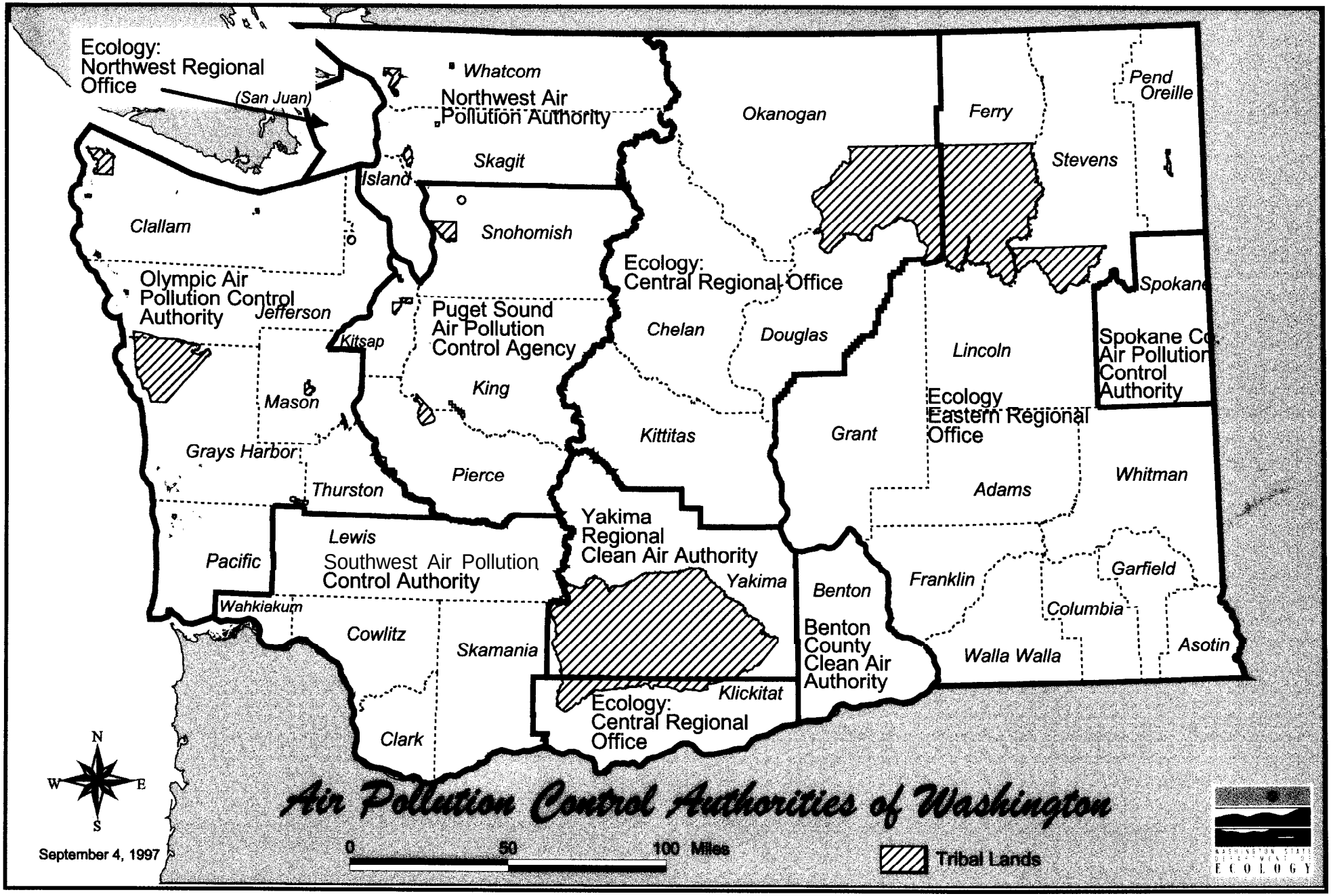
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WASHINGTON STATE DEPARTMENT OF ECOLOGY

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Focus

Major Air Pollutants

Carbon Monoxide

Background

You can't see it. You can't smell it, But more carbon monoxide gas dirties the air in Washington than any other pollutant. Carbon monoxide can cause headaches and drowsiness. It kills at very high concentrations. When you inhale carbon monoxide it takes the place of oxygen in the blood. The result: your body doesn't get enough oxygen.

Carbon monoxide is a by-product of all kinds of burning: motor vehicle engines, factory boilers, wood stoves and open burning. Motor vehicle exhaust is the leading source of carbon monoxide pollution. The number of motor vehicles in use and the miles traveled have been increasing faster than Washington's population.

Washington's urban carbon monoxide problem

The federal Environmental Protection Agency has declared four parts of Washington as areas where the concentrations of carbon monoxide in the air exceeds the national health-based standard. These locations are:

- The urban areas of western King, Pierce and Snohomish counties;
- Vancouver and souther Clark County;
- Spokane and its surrounding urban area;
- The Yakima-Union Gap area.

Motor vehicles account for at least half of the carbon monoxide pollution in all four areas. Most of the rest comes from wood stoves and fireplaces, industries, and outdoor burning, including forest slash fires and residential and commercial open burning.

Health effects

Carbon monoxide attaches to the red pigment, hemoglobin, which carries oxygen to body tissues. It then interferes with the hemoglobin's ability to supply tissues with the oxygen they need to function. Individuals most sensitive to carbon monoxide exposure are heart patients, people with lung problems and people with blood problems such as anemia.

Symptoms of carbon monoxide exposure may be increased length and frequency of episodes of chest pain for those with heart or other circulatory problems. Other people may experience headaches, dizziness, lack of concentration, fever or nausea. Mood swings, irritability or behavioral changes can also be symptoms of relatively low exposures to carbon monoxide. Higher exposures can result in aggressiveness, unconsciousness and death.

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Controlling carbon monoxide

The Clean Air Washington Act of 1991 provides new and better tools to control carbon monoxide pollution:

- **Vehicle inspections. The** current vehicle emissions testing programs in the Seattle and Spokane areas will expand to include more of Spokane and King counties and extend to parts of Snohomish, Pierce and Clark counties. Diesel vehicles will be tested too.
- **Oxygenated gasoline. Starting** November 1,1992, state regulations require that gasoline sold during the winter have more oxygen in the formula. This will ensure more complete combustion, which will reduce carbon monoxide emissions.
- **Reducing solo commuting.** Major employers in the largest counties will be required to reduce drive-alone commuting by their employees.
- **Transportation planning.** Transportation programs and projects must not make air pollution worse in areas with air pollution problems.
- **Wood stoves.** Tighter emission standards will apply to wood stoves sold in Washington. These standards will result in more efficient wood burning, which in turn will produce less carbon monoxide and other pollutants.
- **Industrial regulation.** Major industries will have to obtain operating permits, which must be updated and renewed every five years. In addition, the state must review and update the pollution control technology standards for carbon monoxide and other industrial pollutants on a five year cycle.
- **Outdoor burning.** Outdoor burning is being phased out in the urbanized parts of Washington.

For more information

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Major Air Pollutants

Nitrogen Oxides

Background

Nitrogen oxides are gases composed of nitrogen and oxygen. Nitrogen dioxide (NO_2) is a public health concern. It is a suffocating brownish-colored gas and a strong oxidizing agent. It reacts easily with water vapor to form acid rain. Nitrogen oxide (NO) is more common but relatively less harmful However, nitrogen oxides emitted into the air are converted to nitrogen dioxide by photochemical reactions promoted by sunlight, and,eventually cause ozone (or smog) when combined with other air pollutants.

The main sources of nitrogen oxides are motor vehicles, power plants, industry, and solid waste and outdoor burning. Natural sources include volcanoes and forest fires.

Washington's nitrogen oxide problem

Washington does not exceed federal health-based standards for nitrogen oxides. However, nitrogen oxides are a major contributor to ozone pollution. The federal Environmental Protection Agency declared two areas of Washington state as locations where the concentration of ozone in the air exceeds the national health-based standard. More than half of Washington's residents live in these two areas. These areas are:

- Parts of Snohomish, King and Pierce counties, and
- Southern Clark County.

Health effects

Nitrogen oxide is not very toxic, but is rapidly converted to nitrogen dioxide which is toxic. At high concentrations, nitrogen dioxide can cause disturbance in the

- central nervous system,
- circulatory system, and
- enzymesystem.

Nitrogen dioxide can penetrate to the most remote portions of the respiratory tract because of its low solubility in water. At high concentrations it can be fatal. At lower concentrations it can irritate the lungs and lower the body's resistance to respiratory infections such as influenza, pneumonia and bronchitis.

As mentioned above, nitrogen oxides united with hydrocarbons and other volatile organic compounds form ozone or smog. Ozone can pose serious health problems. It can inflame and irritate breathing passages, reduce resistance to other illnesses and cause coughing and wheezing. For further information on ozone, see Ecology's Focus sheet FA-91-128.

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Other effects of nitrogen oxides

In addition to their effects on human health, nitrogen oxides, through their role in producing ozone, also damage other organisms and materials. They can reduce the size of plants and produce leaf spotting. They also change the color of clothing dyes, cause fabrics to lose strength and corrode some metals.

Nitrogen oxides also produce a brown haze that impairs visibility. Ecology evaluates the potential of new sources to harm visibility and applies stringent emission limits to protect our state's scenic resources. Some federal lands (national parks and wilderness areas) have visibility standards that Ecology helps enforce.

In addition, nitrogen oxides contribute to acid rain. Washington has alpine lakes throughout the Cascade range that are sensitive to acid rain.

Controlling nitrogen oxides

The Clean Air Washington Act of 1991 tackles the air pollution problem in Washington State on many levels. The strategies of the Act to decrease the amount of nitrogen oxides and ozone in the air around us include:

- Reduction of traffic and the use of single-occupancy vehicles,
- Reductions in slash and agricultural burning,
- Permit program for industrial facilities, and
- Research into, and use of, alternative fuels.

More information

Ecology has prepared fact sheets on each major element of Clean Air Washington, as well as major pollutants, These are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

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If you have special accommodation needs or require this document in alternative format, please call Ecology's Air Quality Program at (360) 407-6830 (voice); or (360) 407-6006 (TDD only).

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Major Air Pollutants

Ozone

Background

Ozone is a key component of smog. Ozone at ground level is different from the "good" ozone in the upper atmosphere that protects us from the sun's harmful rays. Ground level concentrations pose a risk to human, animal and plant life.

Ground level ozone comes from the interaction of ultraviolet rays from sunlight on emissions from motor vehicles, industry, solvents and gasoline fumes. It is formed on warm sunny days when two kinds of pollutants mix in the air: gases or vapors of chemicals called volatile organic compounds and nitrogen oxides. Most ozone pollution occurs in late spring, summer and early fall, when the days are longer and there's enough sunlight to heat the chemicals.

Western Washington's ozone problem

More than half of Washington's residents live in areas of the state where the level of ozone in the air exceeds the federal health-based standard. These areas include all of King and Pierce counties, part of Snohomish County and southern Clark County.

The central Puget Sound region did meet the standard in 1985, but by 1988 the area's growth in population and motor vehicle use overwhelmed efforts to keep ozone in check.

Ozone's sources

Most of the air pollutants that form ozone come from many small sources spread over a wide area. Nearly two-thirds of these emissions come from motor vehicles. In addition, vehicle usage is growing two to three times faster than the rate of increase of Washington's population Land use, development and transportation patterns in these areas have fostered continued reliance on the private automobile for basic transportation.

Industry is a smaller contributor to the ozone problem than motor vehicles, but is still a significant source. The commercial, industrial and residential use of solvents add to ozone pollution Dry cleaners, gas stations, auto body paint shops, cleaning of mechanical and electronic parts, outdoor burning and house painting are examples of activities that commonly generate air pollutants that form ozone.

Health effects

Even though ozone is a form of oxygen it can pose serious health problems. Ozone can irritate and inflame the breathing passages in the lungs, throat, nose and sinuses. It can reduce resistance to infections, colds and other diseases. It can cause harmful changes in breathing passages, reduce the lung's working ability and can worsen existing conditions, such as asthma, bronchitis and emphysema.

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Ozone can cause cough, wheezing, chest tightness, dry throat, headache or nausea. People exposed to ozone can experience a tired feeling, shortness of breath or pain during deep breaths. Those at greatest risk are those who exercise heavily during periods of peak ozone concentrations, children, the elderly and those with existing lung or immune system problems.

Ozone's wide-ranging effects

Breezes often blow pollution form the big cities toward rural areas and the mountains. By the time this "urban air" arrives, the ozone can reach its highest concentrations. In fact, the Department of Ecology's ozone monitoring program has recorded its highest readings in the Cascade foothills. People downwind from urban areas during clear weather can be exposed to unhealthful concentrations of ozone in the air.

Ozone can also harm vegetation. The downwind areas that experience high ozone concentrations include some of Western Washington's agricultural areas. The U.S. Forest Service and the National Park Service report that ozone has damaged trees, moss and lichens in Mt. Rainier National Park and in Cascade forests and wilderness areas.

Materials damage attributed to ozone includes cracking of rubber products, weakening of textiles, changes in dyes and premature cracking of paint.

Controlling ozone

The Clean Air Washington Act of 1991 tackles the air pollution problem in Washington State on many levels. The Act requires us to decrease the amount of ozone in the air around us by:

- Motor vehicle inspections,
- Reduction of traffic and the use of single-occupancy vehicles,
- Research into and use of alternative fuels, and
- Permit program for industrial facilities.

In addition to the Clean Air Washington Act activities, Ecology and local air pollution control agencies have been pursuing strategies to control nitrogen oxides and volatile organic compounds, the main ingredients of ozone. These strategies include:

- Gasoline vapor control,
- Regulation of volatile organic compounds and toxic chemicals, and
- Review of permit applications of potential major air pollution sources.

For more information

Ecology has prepared fact sheets on each element of Clean Air Washington, as well as major pollutants. These are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

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If you have special accommodation needs, please call Ecology's Air Quality Program at (360) *407-6830* (voice); or (360) 407-6006 (TDD).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Major Air Pollutants

Particulate Matter

Background

Particulate matter is particles of soot, dust and unburned fuel suspended in the air. The smaller particles, less than 10 microns, are a public health concern. Thousands of these tiny particles would fit on the period at the end of this sentence. Visible smoke is largely composed of these tiny particles. The particles cannot always be seen, since they are so small, but enough can still be present to threaten health.

Particulate matter is a product of many things: soil erosion, road dust, industrial wood waste boilers, wood stoves, slash fires, land clearing fires, agricultural burning and backyard burning. The federal government regulates particulate matter less than 10 microns in diameter as one of six major air pollutants for which health-based air quality standards have been set.

Health effects of particulate matter

Particulate matter larger than 10 microns in diameter collects in the upper respiratory system (throat and nose) and is eliminated by sneezing, coughing, spitting, or the digestive system. Smaller particulate matter is a much more serious health threat.

Your body cannot keep the smaller particulates out of your lungs. Tiny particles collect in the most remote portions of the lungs, called alveoli – the tiny air sacs where oxygen enters the blood stream.

Once in your body, the tiny particulate matter can cause structural and chemical changes deep in the lungs. These small particles can damage the alveoli and act as carriers for other toxic or carcinogenic materials. Damage can result in scarring, which reduces the ability of the lung to absorb oxygen Chronic diseases, such as emphysema, chronic bronchitis, cancer and cardiovascular complications of lung damage have been associated with exposure to fine particles. Death rates from these diseases in U.S. and European cities, have increased during pollution episodes which included increased levels of fine particles. Local studies have also shown a relationship between levels of particulate matter and lung capacity and hospitalization of asthmatic children. The levels affecting these children were below current health standards.

Pre-adolescent children, the elderly and people with pm-existing respiratory diseases are the most susceptible to health problems from particulate matter.

In addition to these health effects, particulate matter can cause damage to materials and can cause deposits on land and in water.

January 1996

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Controlling particulate matter

The Clean Air Washington Act of 1991 tackles the particulate matter problem in Washington State on many levels. The Act requires us to decrease the amount of small particulate matter in the air around us through the following:

- A permit program for industrial facilities,
- Stricter wood stove regulations,
- Restricted backyard and land clearing fires,
- Reduction in slash burning and agricultural burning,
- Decreased traffic and decreased use of single-occupancy vehicles, and
- A permitting system to minimize unnecessary agricultural burning.

You can help decrease particulate air pollution by composting yard waste instead of burning it; using a form of heat other than wood heat or making sure your wood stove is burning cleanly; obeying all burn ban days; and using your car less. For more information on these topics, contact Ecology (see below).

Particulate matter standard may change

The federal and state governments have set a health-based limit for particulate matters, called a standard. This standard is set for particulate matter that is 10 microns in diameter and smaller (the period at the end of this sentence is about 500 microns in size). When monitoring data show that levels of particulate matter have exceeded the standard, various control measures are required, such as curtailing the use of wood stoves in some areas.

Increasingly, research is linking the smallest particles (those under 2.5 microns in diameter) to adverse health effects. Because of this research, the standard is being reviewed by the U.S. Environmental Protection Agency to ensure that public health is adequately protected. If a new standard addressing $PM_{2.5}$ is adopted, it may result in tougher restrictions on wood stoves, outdoor burning and industrial sources.

For more information

Ecology has prepared fact sheets on each major element of Clean Air Washington, as well as major pollutants. These are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call the following Ecology staff:

Ann Butler	Southwest Regional Office	(360) 664-8965
Christine Sund	Eastern Regional Office	(509) 454-7845
Christine Sund	Central Regional Office	(509) 454-7845
Larry Altose	Northwest Regional Office	(360) 649-7192
Tami Dahlgren	Ecology Headquarters	(360) 407-6830

If you have special accommodation needs or require this document in alternative format, please call Tami Dahlgren at (360) 407-6830 (voice) or call (360) 407-6006 (TDD).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Major Air Pollutants

Sulfur Dioxide

Background

Sulfur dioxide is a colorless liquid or gas with a very strong odor. It is one of the six air pollutants regulated by health-based standards of the federal government. Sulfur dioxide is produced by the combustion of fossil fuels at electrical power plants; industrial processes, such as copper smelting and pulp mills; and combustion in motor vehicle engines. Sulfur dioxide is most toxic when combined with small particles and moisture. The conversion of sulfur dioxide to sulfate particles is also considered a significant problem.

Sulfur dioxide in Washington State

Sulfur dioxide levels in Washington State have declined over the past ten years, probably due to the closure of the ASARCO smelter in Tacoma. However, the threat remains and violations of state standards are occasionally recorded near large industrial facilities. The coal-fired power plant near Centralia is a major contributor of sulfur dioxide in the state. Acid rain is a likely outcome should sulfur dioxide levels in Washington State increase.

Health effects

The major health concerns associated with high exposures to sulfur dioxide include effects on breathing and lung illnesses, changes in the lung's ability to defend itself, aggravation of existing respiratory and cardiovascular disease and death.

The people most sensitive to sulfur dioxide include asthmatics and individuals with chronic lung disease (such as bronchitis and emphysema) or cardiovascular disease, and people with allergies. Children and the elderly may also be sensitive. In persons with asthma, the clinical symptoms of brief exposure to low concentrations of sulfur dioxide are shortness of breath, wheezing and coughing.

People chronically exposed to sulfur dioxide have a higher incidence of persistent cough, shortness of breath, bronchitis, fatigue and colds of long duration. Research suggests that the federal standard is not protective of human health.

Other effects of sulfur dioxide

- Sulfur dioxide is one of the ingredients in the formation of acid rain. Acid rain acidifies lakes which destroys aquatic life and makes soil more acid. It can also damage building materials, cloth and metals.
- Sulfur dioxide can lead to decreased visibility because it causes a whitish haze.
- Sulfur dioxide can damage trees and agricultural crops. Some of these effects apparently occur at levels below the federal standard.

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Controlling sulfur dioxide

The Clean Air Washington Act of 1991 tackles the air pollution problem in Washington State on many levels. The strategies of the Act to decrease the amount of sulfur dioxide in the air around us include:

- Permit program for industrial facilities, and
- Reduction of traffic and the use of single-occupancy vehicles.

More information

Ecology has prepared fact sheets on each element of Clean Air Washington, as well as major pollutants. These are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

Tami Dahlgren Outreach Specialist *(360) 407-6830*

If you have special accommodation needs, please call Ecology's Air Quality Program at (360) *407-6830* (voice); or (360) 407-6006 (TDD only).

Washington State Department of Ecology
P.O. Box 47600
Olympia WA 98504-7600

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Major Air Pollutants

Volatile Organic Compounds

Background

Volatile organic compounds (VOCs) are vapors released by cleaning fluids, degreasing agents, gasoline, paints and other widely used products. They include hydrocarbons, some toxic chemicals (diethyl sulfate, tetramethyl lead) and some carcinogens (benzene, vinyl chloride), They contain carbon and hydrogen and other elements, including oxygen, nitrogen, sulfur, chlorine and fluorine. They are in gaseous form at normal atmospheric conditions.

Volatile organic compounds in Washington State

The federal Environmental Protection Agency has found two areas of Washington State where the concentration of ozone (caused by nitrogen oxides and volatile organic compounds) in the air exceeds the national health-based standard. More than half of Washington's residents live in these two areas. These areas are:

- Parts of Snohomish, King and Pierce counties, and
- Southern Clark County.

Health effects

As a group. volatile organic compounds are a concern because they interact with nitrogen oxides in the presence of sunlight to form ozone and other smog.

Ozone can pose serious health problems. It can inflame and irritate breathing passages, reduce resistance to other illnesses and cause coughing and wheezing, headaches and nausea. People who are exposed to ozone can experience a tired feeling, shortness of breath or pain during deep breaths. (See Ecology's Focus sheet on nitrogen oxides, FA-92-30 and Ozone FA-91-128).

Individually some volatile organic compounds are toxic chemicals. They are irritants and neurotoxins that can cause headaches and the inability to concentrate. Some of the important toxic volatile organic compounds are:

- Toluene, a common component of printing inks, paints and solvents, can affect the nervous system. It is emitted into the outside air from such businesses as plastic wrapper printing facilities and painting operations.
- Trichloroethylene, a solvent commonly used to clean and degrease metal aircraft and other mechanical parts, is a probable human carcinogen.
- Perchloroethylene, a cleaning agent used by dry cleaners, is a probable carcinogen.

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Other effects

In addition to their effect on human health, volatile organic compounds, through their role in producing ozone, also damage other organisms and materials. Ozone can reduce the size of plants and cause leaf spotting. It can change the color of clothing dyes, cause fabrics to lose strength and corrode some metals.

Both the National Park Service and the U.S. Forest Service have expressed concerns regarding existing levels of ozone in the Cascade Mountains and the possible effects to the national parks and wilderness areas.

Controlling volatile organic compounds

The Clean Air Washington Act of 1991 tackles the air pollution problem in Washington State on many levels. The Act requires us to decrease the amount of volatile organic compounds and ozone in the air around us by:

- Reductions of traffic and the use of single-occupancy vehicles,
- Permit program for industrial facilities,
- Research into and use of alternative fuels, and
- Permitting programs to reduce outdoor burning.

In addition, Ecology and local air pollution control agencies have been pursuing strategies to control nitrogen oxides and volatile organic compounds.

For more information

Ecology has prepared fact sheets on each major element of Clean Air Washington, as welI as major pollutants. These are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

Tami Dahlgren Outreach Specialist *(360) 407-6830*

If you have special accommodation needs, please call Ecology's Air Quality Program at (360) *407-6830* (voice) or call (360) 407-6006 (TDD).

Washington State Department of Ecology
P.O. Box 47600
Olympia WA 98504-7600

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Clean Air Washington

The Clean Air Washington Act of 1991 sets a comprehensive new course toward cleaner air throughout the state.

Agricultural Burning

Background

The Clean Air Washington Act addresses air pollution from many sources. Programs have been put into place to reduce pollution from motor vehicles, industrial sources and wood stoves as well as outdoor burning.

The problem

Farmers use fire to dispose of the stubble, or "straw" left in the field after harvest and to dispose of trees when an orchard is "pushed up" for replanting. Burning is also used to control weeds and plant diseases. For certain crops--most notably grass seed--farmers use fire to stimulate the yield. An estimated 3,000 to 5,000 agricultural fires are set each year in Washington, with up to 600,000 acres thought to be burned. While often only a few hours in duration, these fires produce substantial amounts of smoke, containing small particles. These small particles can be inhaled deep into the lungs and lodge there, causing structural and chemical damage.

Agricultural burning, in combination with other types of outdoor burning, accounts for more than 10 percent of Washington's annual air pollution and a much higher percentage of eastern Washington's air pollution. Ecology, local air pollution control agencies and other environmental and health organizations receive hundreds of complaints each year regarding health problems and impaired visibility associated with agricultural burning.

In order to reduce air pollution from agricultural burning, a special advisory committee made up of members of the agricultural community and others worked for over two years to write a regulation. The goal of this regulation is to eliminate unnecessary burning without overly restricting the agricultural industry.

In addition, the Agricultural Burning Practices and Research Task Force, comprised of agricultural experts, regulators and medical representatives, is charged with setting fees, recommending research priorities and establishing best management practices.

When to get a permit

By law, permits are required for all farm burning except orchard prunings; natural vegetation along fencelines, irrigation or drainage ditches; or natural vegetation blown by the wind (i.e. tumbleweeds). In areas where the state administers the program, permits will be required for agricultural burning totalling 10 acres or more per year. The same is true where the state has delegated the program to a conservation district, county or fire district. (The program may differ slightly in areas under the jurisdiction of local air pollution control authorities.)

The fee for a permit is a maximum of $2.50 per acre. It could be lower in some years in some locations depending upon research and administrative needs. In 1995 the fee was set at $2.00 per acre. The fee pays for research into alternatives to burning and local permit program administrative costs.

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Best Management Practices

The Agricultural Burning Practices and Research Task Force developed best management practices (BMPs) for each major category of agricultural crops. BMPs help in determining when burning is necessary and when it is not. The permit application will ask questions that can be answered by referring to the BMPs. BMPs may be changed periodically to reflect changes in the industry and research results. For more information about BMPs contact Pat McGuire, Department of Ecology, (509) 456-3121.

Getting a permit to burn on the farm

In many areas, the agricultural burning permitting program will be administered by a local air pollution control agency, the county, a fire protection agency or the local conservation district. In areas where no local agency opts to run the program, the state Department of Ecology will issue permits. For more information about how to get a permit, call:

Central Washington:

Donna Smith, Yakima l-800-501-01 14 or (509) 454-7660

Eastern Washington

Pat McGuire, Spokane l-800-406-5322 or (509) 456-3121

Or call your local air pollution control authority:

Eastern Washington:

In Spokane County, call the Spokane County Air Pollution Control Authority at (509) 456-4727.

In Benton County, call the Benton County Clean Air Authority at (509) 946-0865.

In Yakima County, call the Yakima County Clean Air Authority at (509) 575-4116.

Western Washington:

In King, Kitsap, Pierce, and Snohomish counties call the Puget Sound Air Pollution Control Agency at (206) 689-4053.

In Island, Skagit and Whatcom counties call the Northwest Air Pollution Authority at (206) 428-1617.

In Clallam, Grays Harbor, Jefferson, Mason, Pacific, and Thurston counties call the Olympic Air Pollution Control Authority at (206) 438-8768.

In Clark, Cowlitz, Lewis, Skamania, Wahkiakum counties call the Southwest Air Pollution Control Authority at (206) 574-3058.

If you have special accommodation needs or require this document in an alternative format, please contact Tami Dahlgren at (360) 407-6830 (voice) or (360) 407-6006 (TDD only).

Clean Air Washington

WASHINGTON STATE DEPARTMENT OF ECOLOGY

The Clean Air Washington Act of 1991 sets a comprehensive new course toward cleaner air throughout the state.

Forest Slash Fires

Slash burning

Timber land managers use slash burning to dispose of logging residue after trees are harvested. Current law requires forest land managers to obtain a burning permit. The Department of Natural Resources (DNR) and Ecology monitor weather conditions so that fires are set when smoke will blow away from population centers and scenic areas. The permits require fir control and containment measures.

Slash fires can smolder for days and release substantial amounts of smoke. In some cases, individual slash fires release more pollution in several hours than some large industrial plants do in a year. Each year in Washington, logging operations set more than 1,000 slash burns, burning more than 800,000 tons of wood, on more than 50,000 acres.

DNR has practices that minimize slash burning. Since 1980, DNR has reduced slash burning on its lands by over 90%. Slash is now burned on less than five percent of the acres harvested each year, significantly below the industry average.

The Problem

Slash burning is only one of many kinds of outdoor burning. Outdoor burning also includes leaf and yard waste burning and controlled burning of farm fields. Outdoor fires account for more than 10 percent of Washington's annual air pollution:

- 255,000 tons of carbon monoxide;
- 20,000 tons of volatile organic compounds, which contribute to ozone pollution;
- 26,000 tons of p articu late m atter; as well as
- toxic air pollutants.

These fires are burned in the drier months, resulting in higher emissions at those times. This magnifies the effects of outdoor burning beyond its 12 percent share of total state air pollution. Air quality levels can exceed federal health standards in areas affected by outdoor burning, especially from larger fires, or when dispersion of smoke by wind or rain is poor. Particulate pollution -tiny particles suspended in the air -from outdoor burning contributes to the smoke haze that obscures Washington's scenery. This harms a visual resource that is vital to the state's tourism industry.

What Clean Air Washington does

- Reduces slash burn emissions through a phased approach, based on 1985-89 averages:
  - 20 percent by the year 1995; and
  - 50 percent by the year 2001.
- Directs DNR to develop and implement a plan to achieve the reductions, beginning in July 1992.

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- Declares that the emission reduction requirements apply to all forest land — including federal — in Washington.
- Directs DNR to encourage alternative disposal methods in the following priority:
  - production of less slash;
  - better use of slash;
  - disposal without burning; and
  - slash burning.
- Requires DNR to establish a slash burning permit fee to cover the cost of permit system administration and enforcement.
- Declares that slash burning shall not dam age public health or the environment.
- Requires DNR to coordinate the issuance of slash burning permits with local air quality authority rules. DNR may not permit slash burning during an air pollution episode or an air quality impairment.

For more information

Ecology has prepared fact sheets on each major element of Clean Air Washington. Any or all of these are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

Tami Dahlgren Outreach Specialist *(360) 407-6830*

If you have special accommodation needs or require this document in alternative format, please contact Ecology's Air Quality Program, (360) 407-6830 (voice); or (360) 407-6006 (TDD only).

Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

The Clean Air Washington Act of 1991 set a comprehensive new course toward cleaner air throughout the state.

Open Burning

What is open burning?

People use outdoor fires for many purposes. Home owners burn leaves. Firefighters learn and practice their skills with training fires. Contractors burn debris at demolition and construction sites. And, of course, people use fire as a part of outdoor recreation for cookouts and campfires.

The types of burning listed above are classified as "open burning," which is one of three kinds of outdoor burning. The others are agricultural and silvicultural (forest land) burning. Open burning is the combustion of material of any kind in an open fire or in an outdoor container (such as a burn barrel) except agricultural and silvicultural fires. These fires have different permitting systems. Other exceptions to this rule are ceremonial fires, recreational fires, and special cases where ecosystems are dependent on fire.

The problem

Outdoor burning releases carbon monoxide, particulate matter, and volatile organic compounds into the air. Carbon monoxide is a gas that interferes with the body's ability to absorb oxygen. It can cause headaches, drowsiness, and even death at high concentrations. Particulate matter is made up of tiny particles of soot, dust, and unburned fuel suspended in the air. Visible smoke is largely composed of these particles. Chronic diseases such as emphysema, asthma, chronic bronchitis and cancer have been linked to exposure to fine particulate matter. Volatile organic compounds contribute to the formation of ozone pollution. Ozone can irritate and inflame the breathing passages in the lungs, throat, nose, and sinuses. It can cause coughing, wheezing, chest tightness, dry throat, headaches, or nausea. Outdoor burning is also known to release toxic air pollutants. Much of this pollution is released during half of the year, making its impact more concentrated.

The Open Burning rule

The Clean Air Washington Act passed by the legislature in 1991 required new regulations for open burning. The purpose of these regulations is to reduce emissions from burning of yard, garden, residential or commercial, demolition/construction, and land clearing debris by using reasonable alternatives. Following state law, the rule bans open burning in areas that do not meet federal health-based air quality standards (nonattainment areas) for pollutants released by open burning. The rule establishes conditions for when burning can occur, and requires permits for burning in areas of the state where burning is still allowed. In addition, it calls for a ban on open burning by the year 2001 in "urban growth" areas and cities with a population of 10,000 or more.

Implementation

Phase-out: The new rule allows for a "phase-out" (instead of an immediate ban) approach in nonattainment areas where alternatives to open burning are not yet available. These areas are still required to meet federal Environmental Protection Agency deadlines for nonattainment areas.

Permit program: The law identifies potential permitters for the open burning program. They include conservation districts, fire protection authorities, counties, Ecology, and local

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air pollution control agencies. Under regulations adopted in 1992, Ecology and local air pollution control agencies will work in cooperation with these groups to develop model permit and response programs to be implemented locally if the local agency chooses. In some cases, local jurisdictions may choose to let the state administer the program.

Reasonable Alternatives: The law requires the state to support and encourage the use of economical and reasonable alternatives to open burning. The rule defines reasonable alternatives as those costing less than $8.50 per cubic yard of waste. As alternatives become available locally, open burning will be banned in some areas.

Prohibited materials

Open burning of the following materials is prohibited by law:

- Garbage
- Asphalt
- Plastics
- Paper
- Metal
- Construction debris
- Rubber products
- Petroleum products
- Dead animals
- Treated wood
- Cardboard
- Any substance other than natural vegetation which, when burned, releases toxic emissions, dense smoke, or obnoxious odors

For more information

Ecology has prepared fact sheets on each major element of the Clean Air Washington Act. These are available from the Washington State Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600.

Telephone inquiries may be directed to:

Ann Butler	
Air Quality Program, Olympia	(360) 407-6334
Christine Corrigan	
Air Quality Program, Yakima	(509) 454-7845
Larry Altose	
Air Quality Program, Bellevue	(206) 649-7192

If you have special accommodation needs, please contact Tami Dahlgren at (360) 407-6830 (voice); or (360) 407-6006 (TDD only).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Open Burning: Prohibited Materials

Background

Until recently, burning was a common way to dispose of trash such as paper, cardboard and junk mail. Although burning of garbage has been prohibited since 1974, some people still consider it an acceptable practice. However, with increasing population growth, burning of any prohibited materials such as garbage or plastic has become recognized as a significant health risk and public nuisance.

Prohibited materials

State law (Chapter 70.94 RCW) banned outdoor burning of certain materials in 1974. Those prohibited materials include:

- **Garbage**
- **Rubber products**
- **Asphalt**
- **Any substance that emits dense smoke or obnoxious odors (other than natural vegetation)**
- **Petroleum products**
- **Plastics**
- **Dead animals**

In January 1993, rules were adopted adding the following specific materials which are also prohibited:

- **Paper**
- **Treated wood**
- **Metal**
- **Cardboard**
- **Construction debris**
- **Any substance which when burned releases toxic emissions, dense smoke or obnoxious odors (other than natural vegetation)**

The only materials that may be legally burned in an outdoor fire are dry, natural vegetation and, in some cases, clean, dry, untreated, unpainted wood that is not construction debris.

Note: **Regardless of the material, outdoor burning is banned altogether in some areas and is prohibited during certain times of the year in others. Check with your local air pollution control authority or fire protection district.**

Health effects

Medical research has shown that air pollution causes lung damage. The smoke from burning wood and natural vegetation contains more than 100 chemical compounds and three major types of pollutants. These include carbon monoxide, volatile organic compounds and particulate matter. If you burn prohibited materials such as plastics, painted wood or garbage, additional toxic compounds are emitted. These may include dioxin, furans, benzene, formaldehyde and polycyclic aromatic hydrocarbons. Many of these chemicals are known carcinogens.

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These toxic chemicals attach themselves to small particles in the smoke. The health risks associated with inhaling small particulate matter are made worse when the particles are carrying a load of toxic molecules. These small particles go deep into the lungs.

Burn barrels

Burn barrels should not be used, even for burning natural vegetation. The design of burn barrels restricts the flow of oxygen to the fire, resulting in excessive amounts of smoke. In addition, these fires are a hazard because embers can smolder and drift long after the flames have died.

Open burning of natural vegetation

The 1991 Clean Air Washington Act protects air quality in Washington. One way it does this is by requiring new regulations for open burning. Following state law, the regulation bans open burning in areas that do not meet federal health-based air quality standards (nonattainment areas) for pollutants released by open burning (particulate matter and carbon monoxide). The rule establishes conditions for when burning can occur, and requires permits for burning in areas of the state where burning is still allowed. In addition, it calls for a ban on open burning by the year 2001 in "urban growth" areas and cities with 10,000 or more residents.

Alternatives to burning

Consider chipping large prunings and mulching or composting your food and garden waste. Recycle paper, plastic, glass, aluminum and metal. For information on recycling call 1-800-RECYCLE or your county's solid waste division. For waste that can't be recycled, use a garbage collection service or haul to the local landfill. Disposing in a landfill is not an ideal alternative; the best way to handle the problem of garbage is to create less of it. Buy durable products rather than disposable ones and look for recycled products and packaging.

For more' information

For open burning rules in eastern Washington, call tollfree l-800-5723973. For more information on prohibited materials or open burning, contact the following Ecology staff:

In eastern Washington:

Christine Sund **(509) 454-7845**
Central Regional Office

In western Washington, contact your local air pollution control agency.

If you have special accommodation needs, please call Christine Sund at (509) 454-7845 (voice), or Tami Dahlgren at (360) 407-6830 (voice); or call (360) 407-6206 (TDD).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Outdoor Burning
Legislative Changes

In 1995 the Washington State Legislature passed Engrossed Substitute House Bill 1080, which changed the air pollution requirements for open or residential burning and agricultural burning.

Open burning changes

Open burning is residential or land clearing burning of vegetative material. The legislature removed the requirement for residential burning permits in rural areas of any county with fewer than 50,000 people living in unincorporated areas. The rural area of a county is defined as being outside the urban growth area determined under Growth Management Act planning, or the unincorporated area of a county which does not plan under the Growth Management Act.

Where are open burning permits required?

Residential burning:

Permits for residential burning are still required in urban areas of all counties, and in rural areas of the following counties:

Clark	King	Kitsap
Pierce	Snohomish	Spokane
Thurston	Whatcom	Yakima

Land clearing burning:

Permits for land clearing burning are still required in all counties

Agricultural burning changes

The legislature removed the requirement for permits and fees for burning of orchard prunings, organic debris along fence lines or irrigation or drainage ditches, and organic debris blown by wind. However, burning of these materials remains prohibited during air pollution episodes or any stage of impaired air quality.

Next steps

The Department of Ecology will need to revise the state's open and agricultural burning regulations (Chapter 173-425 Washington Administrative Code and Chapter 173-430 Washington Administrative Code) to reflect the changes made by the legislature. Because formal rule-making will take some time, Ecology will be working with local air pollution control agencies during the next few months to develop an interim policy on burning. The interim policy is intended to provide guidance to Ecology, local air pollution control agencies, local governments, and the public on the implementation of the revised law.

August 1995

95-1003-Air

For more information

Jim Crawford (360) 407-6862
Department of Ecology

Stu Clark (360) 407-6873
Department of Ecology

If you have special accommodation needs or require this document in alternative format, please call Tami Dahlgren, Air Quality Program, (360) 407-6830 (voice) or (360) 407-6006 (TDD only).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Controlling Wood Smoke Pollution

Background

Washington's wood heat regulation implements the 1991 Legislature's Clean Air Washington Act. The 1991 legislation restricts indoor burning and emphasizes education and enforcement to control wood stove pollution.

Pollution from Wood Smoke

Nearly half of Washington's households have wood burning devices. During the past 15 years the number of wood stoves, fireplaces, pellet stoves, and fireplace inserts in Washington State has grown rapidly. Wood burning units can emit hundreds of times more pollution than other forms of heat such as natural gas, electricity, or oil.

Heating with wood accounts for about 12 percent of Washington's air pollution on an annual basis. The impact of this pollution is much larger for two reasons:

- Virtually all of it is released during winter months. It takes just half the year for wood smoke to become Washington's third leading source of air pollution.
- A common feature of Washington's winter climate is stagnant air. Wood smoke does not disperse under such conditions. It is trapped near the ground and accumulates in the neighborhood air.

Seven areas in Washington exceed federal health standards for particulate air pollution. Particulate is the fine matter that makes up smoke and soot.

Wood Smoke and Health

The smoke from wood burning devices can cause serious health problems. Breathing air containing wood smoke contributes to cardiovascular problems; lung diseases like asthma, emphysema, pneumonia and bronchitis; irritation of the lungs, throat, sinuses and eyes; headaches; and allergic reactions. Those with the greatest health risk from wood smoke include infants and children, pregnant women and people with lung and heart diseases.

There are hundreds of chemical compounds in wood smoke, including many that are irritating and potentially cancer causing. Wood smoke pollutants include nitrogen oxides, carbon monoxide, organic gases and particulate matter. University of Washington studies show decreased lung function and increased respiratory disease in both healthy and asthmatic children exposed to wood smoke in some Seattle neighborhoods.

Particulate matter may be the most insidious component of wood smoke pollution. Most of the particles are so small that when inhaled they get past the hairlike cilia that protect the air passages of the lungs. The tiny particles are called PM_{10}. They are less than one one-hundredth of a millimeter across. They lodge in the deepest part of the lungs, where the blood takes on oxygen The particles can cause structural and biochemical changes, including scarring of the tissue. Many of the particles are toxic. Death rates in several U.S. cities have been shown to increase with higher levels of PM_{10} in the air.

November 1995

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Washington's Wood Smoke Control Program

The 1991 Legislature established a program to help protect the public from wood smoke pollution, especially in residential areas. The Clean Air Washington Act of 1991 tightened emission standards for new wood stoves and other solid **fuel** burning devices.

The current program

- **Bans installation of uncertified stoves after January 1,1992.**
- **Requires non-wood heat sources after July 1,1992 in new** or substantially remodeled construction in urban areas or areas that don't meet federal air quality standards for particulates. This is so that wood is not the sole source of adequate heat.
- **Wood fuel must have a moisture content of 20 percent or less.** Wood that is split, then dried for at least a year, usually meets this requirement. (For a free plan to build a wood storage shed, see Ecology publication M-62, 'Woodshed Design.")
- **Prohibited materials.** Garbage, treated wood, particle board, plastics, rubber, animal carcasses, asphalt products, paint, chemicals or any substance which normally emits dense smoke or obnoxious odors may not be burned in a wood stove or fireplace.
- **Smoke density is restricted. The** maximum smoke plume opacity (how much you can't see through the smoke) is 20%, except six minutes stoking time per hour, and **20** minutes every four hours for fire starting. This is to ensure that people give enough air to their fires to promote efficient fires and less pollution.
- **Tighter emission standards for new certified stoves and fireplace inserts sold at retail in Washington. Stack** emissions of new certified models are limited to:
  - 4.5 grams of particulates per hour for non-catalytic models.
  - **2.5** grams per hour for catalytic models (stoves with catalytic converters built in).
  - Stoves with at least a 35-to-1 air/fuel ratio are "non-affected;" they burn relatively cleanly already (almost all are pellet stoves) and do not require certification to be sold in Washington
  - Look for the EPA Emission Certification label, or check Ecology's list of certified stoves (available at no cost by calling l-800-523-4636).
- **Local bum bans are called when wood smoke pollution is measured at unsafe levels. This is a two stage plan**
  - Stage 2: The use of all uncertified wood heating devices-including fireplaces-is prohibited **when** pollution approaches unhealthful levels (an average of 75 micrograms of fine particulates per cubic meter of air over 24 hours, or an average eight parts per million of carbon monoxide over eight hours). Certified and non-affected stoves may be operated.
  - Stage 2: All wood heating-including certified and non-affected devices-is prohibited when pollution reaches a higher threshold (a 24hour average of 105 micrograms of fine particulates per cubic meter of air).

  Homes with no other source of adequate heat are exempt from these bans. Adequate heat means a system that can maintain a temperature of 70 degrees Fahrenheit three feet off the floor, when the heater is operating as designed.
- **$30 fee on the sale of new wood stoves and fireplaces.** This supports state and local air pollution control agency wood stove education and enforcement programs.

Changes still to come under Clean Air Washington

- **Sets emission standards for new masonary and** factory built fireplaces.

After January 1,1997, all fireplaces offered for sale in Washington must meet certification standards comparable to the 1990 wood stove standards. Masonry fireplaces must also meet design standards that achieve similar emission reductions. The State Building Code Council will devise fireplace construction standards and testing methods to meet this emission requirement.

State Air Pollution Episodes

The Department of Ecology's four step Air Pollution Episode Plan no longer affects indoor burning at the first step, or Forecast level. If an Episode reaches the Alert, Warning or Emergency level, Ecology can curtail the use of wood heat. The Alert level has not been called since 1981 and this applied only to downtown Tacoma. The Warning and Emergency levels have never been put into effect.

Only outdoor burning is banned under the Forecast level of a State Air Pollution Episode. Indoor burning may only be curtailed locally under the two stage program described above, based on instrument measurements of air quality.

Uncertified Stove Bans as a Contingency Measure

The 1991 legislation authorizes a local air quality authority or Ecology to prohibit the use of uncertified stoves if:

- the U.S. Environmental Protection Agency finds and shows in writing that an area has failed to make reasonable progress in meeting federal health-based air quality

Low income persons, certified and most pellet stoves, and fireplaces would be exempt from the ban

Tips for Cleaner Burning

The most complete and effective way to reduce wood smoke pollution is to use another form of heat. If you must use wood, or choose to do so when local rules permit, the following recommendations can help diminish the emissions from your wood stove, fireplace or fireplace insert:

- Only burn dry, seasoned wood. Be sure your firewood has been split and dried for at least one year.
- Never burn wet, painted, stained or treated wood, color newsprint, plastic, garbage, diapers or magazines. Items such as these produce high amounts of odor, smoke and toxic fumes.
- Store your firewood under cover. A shed or shelter is best. If you use a plastic tarp, allow ventilation to prevent condensation. Easy plans for a shelter can be requested over the Information Line: 1-800-523-4636.
- Burn small, hot fires. This helps the wood burn completely and cleanly.
- Never allow the fire to smolder. Smoldering fires are the worst polluters because they burn at a temperature too low for efficient combustion. The result is more smoke – unburned wood going up the chimney, wasted.
- Do not damper too much. Allow enough air for the wood to burn fully, without smoldering. Never try to keep the "fire" going overnight by cutting back the air supply. This wastes wood, produces much smoke and creosote and produces little heat.
- Step outside and look at the plume from your chimney. You should see only heat waves. If you can see smoke, your wood is not burning completely. Increase the air supply to your fire.

- Size your wood stove properly. A stove that is too large for the space to be heated will have to be damped down, causing much smoke and wasting wood.
- Do not burn in moderate temperatures. Your stove will tend to overheat your house. You will want to close the dampers to cut back on the heat, which cuts oxygen to the fire, wastes wood and increases pollution.
- Proper stove installation is very important Even the least polluting certified stoves will not function well if the installation does not meet the specification for each model. (This is not the same as safety specifications, which also must be followed.)
- Don't install a wood stove until you've considered other ways to cut heating costs. Insulating and weather stripping can cost less than a stove and will reduce your heating requirements, whether your heat source is wood, oil, gas or electricity. Many cities, counties, housing authorities and utilities offer conservation and weatherization programs in the form of grants, low-interest or interest-free loans, and free weatherization materials and installation
- Don't install an uncertified stove – installation of uncertified stoves is illegal. These stoves are more polluting. They may be banned in some counties after June 30,1995.

For More Information

- **Ecology Wood Smoke Information Line: 1-800-523-4636. You can** leave a message to ask questions and request more written material about Washington's wood smoke program.
- Washington **State Energy Office Hotline:** Specialists can answer your energy questions, including inquiries on wood heat. Many free publications are available, with topics ranging from home insulation and solar water heating to sizing and installing wood stoves. l-800-962-9731.
- Local **Air Pollution Control Authorities:**
  - **Puget Sound Air Pollution Control Agency,** serving King, Snohomish, Kitsap and Pierce Counties, 1-800-552-3565, (206) 343-8800. For recorded information on indoor burning restrictions call: 1-800-595-4341.
  - **Olympic Air Pollution Control Authority,** serving Thurston, Clallam, Grays Harbor, Jefferson, Mason and Pacific Counties, (360) 438-8768, 1-800-422-5623. When in the local radio area, tune in 530 AM for indoor burn ban information.
  - **Southwest Air Pollution Control Authority,** serving Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, (360) 574-3058, 1-800-633-0709.
  - **Northwest Air Pollution Authority,** serving Skagit, Whatcom and Island Counties, (360) 428-1617, or 1-800-622-4627 (Island and Whatcom counties only).
  - **Spokane County Air Pollution Control Authority,** (509) 456-4727.
  - **Yakima County Clean Air Authority,** (509) 574-1410
  - **Benton County Clean Air Authority,** Richland, (509) 946-4489.
  - **Ecology's Central Regional Office,** serving Chelan, Douglas, Kittitas, Klickitat and Okanogan Counties, (509) 575-2490.
  - **Ecology's Eastern Regional Office,** serving Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla and Whitman Counties, (509) 456-3114.

If you have special accommodation needs, please call (360) 407-6832 (voice) or (360) 407-6006 (TDD only).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Episodes and Impairments

Overview

Air Pollution Episodes and Air Quality Impairments are programs designed to protect the public from unhealthy levels of air pollution. The state Department of Ecology carries out the Episode program. Local air quality agencies administer Air Impairment programs. In most cases, Episodes restrict only outdoor burning, including residential yard debris fires, burn barrels, land clearing fires, forest slash fires and agricultural burning. Impairments affect outdoor and indoor burning, including fireplaces, wood stoves, fireplace inserts and pellet stoves.

Air Stagnation

Air stagnation is similar to being in a closed room with no ventilation. It is difficult to breathe comfortably until a window is opened, or a fan is turned on.

The air over the state can work the same way. When air movement is limited or becomes "stagnant," air pollutants can become concentrated or "trapped" in certain areas. The air and pollutants cannot move or circulate out of these areas.

Stagnant air conditions usually occur when a large high pressure system settles over the Pacific Northwest. Air movement is restricted as the surface air becomes cooler than the air above. These conditions cause dust, wood smoke, carbon monoxide, sulfur dioxide and other air pollutants to accumulate at increasing levels close to the ground. These conditions most often occur during the late fall and winter.

Air Impairments

Local air quality authorities may declare air impairments based on monitored levels of pollution and weather forecasts. There are two stages of these impairments. All outdoor burning is prohibited during either stage. For indoor burning, there are differences between the two stages:

Stage One

A stage one air impairment is declared when PM-10 particulates (particles less than one one-hundredth of a millimeter across, suspended in the air) are measured at an average of at least 75 micrograms per cubic meter of air over 24 hours, or when carbon monoxide is measured at an average of eight parts per million over eight hours.

- During a stage one air impairment, the use of fireplaces and *uncertified* stoves and fireplace inserts is prohibited unless wood is the only source of adequate heat.

Stage Two

A stage two air impairment is declared when PM-10 particulates are measured at an average of at least 105 micrograms per cubic meter of air over 24 hours.

- During a stage two air impairment, use of *all* wood stoves, fireplaces, fireplace inserts and pellet stoves—certified or not—is prohibited, unless wood is the only source of adequate heat.

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Air Pollution Episode Program

The state Air Pollution Episode Program has four stages which are determined by Ecology depending on pollution levels and current and predicted weather conditions.

Forecast Stage

A Forecast stage is declared by Ecology when meteorological data indicate that stagnant weather conducive to the build-up of air pollutants will persist for at least 24 hours. Forecast stages are generally declared for relatively large areas (statewide, Eastern Washington, Western Washington, or specific counties).

During a Forecast stage:

- All outdoor burning, including slash burning, is prohibited and all existing outdoor fires must be extinguished.
- No new burning permits will be issued.

In previous years the Forecast stage meant a ban on wood **heat** devices. This is no longer the case, due to legislation passed in 1990 and implementing rules adopted in March, 1991.

Alert, Warning and Emergency Stages

The Alert stage of an Air Pollution Episode Program has not been called since 1981 and this applied only to in Downtown Tacoma; the Warning and Emergency stages have never been declared. They would come in response to pollution levels that significantly threaten public health. They can include progressively stringent steps-including wood heat bans, curtailment of motor vehicle use and industrial restrictions or shutdowns-to reduce the emission of pollutants into the air. Ecology-r, at the Emergency level, the Governor-would announce these stages, and the actions to be taken under them, through the media.

Air Stagnation Advisories

The National Weather Service calls Air Stagnation Advisories to warn about stagnant air conditions. Experts at the Weather Service, Ecology and the local air quality agencies share data and consult regularly. Forecast Episodes generally are declared after an Advisory is issued. But the calling of an Air **Stagnation** Advisory does not necessarily mean an Impairment or Episode will follow. Advisories often cover broad regions, sometimes several states, while Episodes and, especially, Impairments relate to local conditions.

For more information

Ecology **Toll Free Wood Smoke Information Line l-800-523-4636**: **You can** leave a message to ask questions and request more written material about Washington's wood smoke program.

Clean Air Washington

WASHINGTON STATE DEPARTMENT OF ECOLOGY

The Clean Air Washington Act of 1991 sets a comprehensive new course toward cleaner air throughout the state.

Motor Vehicle Emission Check Program

The problem

Motor vehicles are Washington's largest air pollution source, accounting for more than 50 percent of the statewide total, or nearly 1.3 million tons of air pollutants per year. The urban areas of Clark, King, Pierce, Snohomish and Spokane counties exceed the federal health standard for carbon monoxide, largely because of motor vehicle pollution. Motor vehicle emissions in King, Pierce, Snohomish and Clark counties are a major reason why these counties exceed federal ozone pollution standards. At the same time, vehicle use is growing two to three times faster than Washington's rate of population increase, undoing past vehicle emission control accomplishments.

One solution: motor vehicle emission checks

The goal of the vehicle emission check is to ensure that all factory installed emission control systems are working properly. Federal law requires this in areas where carbon monoxide and ozone pollution exceeds federal health standards. The emission check identifies the most polluting vehicles and requires proper repair of these vehicles.

The program applies to vehicles registered in the urban areas of King, Pierce, Snohomish, Spokane and Clark counties.

Every other year vehicles must pass an emission test or spend a given amount in repairs to be re-registered. The inspection fee of $12 is paid in cash at the inspection station. There is no charge for the first re-test of a vehicle that fails the initial test.

What Clean Air Washington has done

- **Allowed the vehicle emission check** program to be enhanced and expanded, as required by federal law.
- **Included** diesel vehicles in the motor vehicle emission check program.
- **Changed the waiver requirement. One hundred** dollars must be spent on repairing **a** pm-1981 vehicle that fails a retest before a waiver can be granted preventing further expense to **a vehicle's owner. For** 1981 and newer vehicles the limit is $150. The waiver does not apply for:
  - vehicles less than five years old;
  - vehicles with less than 50,000 miles (check the vehicle's warranty);
  - vehicles with tampered or removed emission control equipment; or
  - vehicles repaired by someone other than a Department of Ecology Authorized Emission Specialist.
- **Requires** an emission check before a new owner can change registration of that vehicle if purchased from a private party or from outside the state.

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- **Requires annual** emission check of all state and local government vehicles in the check areas. It also requires the emission check of state vehicles statewide when 20 or more are kept at the same location.
- **Exempts** new vehicles from emission testing if the vehicle year is the same as or newer than the current calendar year.

For more information

Ecology has prepared fact sheets on each major element of Clean Air Washington. Any or all of these are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600.

Telephone calls on the vehicle inspection program may be directed to the Vehicle Emission Information Number, l-800-453-4951. For information on other elements of Clean Air Washington please contact:

Sandi Newton Outreach Specialist (360) 407-6826

If you have special accommodation needs or require this document in alternative format, please call Tami Dahlgren, Air Quality Program (360) 407-6830 (voice); or (360) 407-6006 (TDD only).

Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Emission Check Program Areas

The motor vehicle emission **check** program applies to 1968 and newer gasoline and diesel cars and trucks registered within the areas defined **by** the ZIP Codes listed below.

For more information:

Call l-800-453-4951, toll-free, 7 a.m. to 7 p.m. Monday through Friday.

King

Auburn	98001-02, 98063, 98071, 98092	Maple Valley	98038
Bellevue	98004-09, 98015	Medina	98039
Bothell	98011-12, 98021, 98041	Mercer Island	98040
Burien	98166	Milton	98354
Des Moines	98198	Pacific	98047
Federal Way	98003, 98023, 98063, 98093	Redmond	98052-53, 98073
Hobart	98025	Redondo	98054
Issaquah	98027	Renton	98055-59
Kenmore	98028	Seahurst	98062
Kent	98031-32, 98035, 98042, 98064	Seattle Area	98101-199 (Except 98110.)
Kirkland	98033-34, 98083	Tukwila	98188
Lake Forest Park	98155	Woodinville	98072

Pierce County

Du Pont	98327	McMillin	98352
Fife	98424	Milton	98354
Fircrest	98466	Parkland	98444, 98447
Fort Lewis	98433	Puyallup	98371-74
Frederickson	98446	Spanaway	98387
Gig Harbor	98332, 98335	Steilacoom	98388
Graham	98338	Sumner	98390
Kapowsin	98344	Tillicum	98498
Lakeview	98499	Tacoma Area	98401-499
McChord AFB	98438-39		

Snohomish County

Bothell	98011-12, 98021, 98041	Mill Creek	98012
Edmonds	98020, 98026	Mountlake Terrace	98043
Everett	98201-08	Mukilteo	98275
Lake Stevens	98258	Snohomish	98290-91
Lynnwood	98036-37, 98046	Woodinville	98072
Marysville	98270-71		

(See other side for Clark and *Spokane counties.)*

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Clark County

Camas	98607	Washougal	98671
Vancouver Area	98660-68, 98682-86	(Excluding Skamania County portion.)	

Spokane County

Airway Heights	99001	Mead	99021
Colbert	99005	Newman Lake	99025
Four Lakes	99014	Otis Orchards	99027
Greenacres	99016	Spokane	99200-299
Liberty Lake	99019	Veradale	99037

For more information:
Call l-800-453-4951, toll-free, 7 a.m. to 7 p.m. Monday through Friday.

If you have special accommodation needs, please contact Sandi Newton, Air Quality Program at (206) 407-6826 (voice) or (206) 407-6206 (TDD only).

(See other side for King, Pierce and ***Snohomish*** counties.)

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Emission Check

You're on the Road to Cleaner Air.

BENEFITS OF WASHINGTON'S EMISSION CHECK PROGRAM

Washington's Motor Vehicle Emission Check Program began in 1982, and has provided significant benefits for the people of our state. Mandated by the federal Clean Air Act for areas that don't meet air quality standards, the program was first established in the Seattle metropolitan area. Three years later, it expanded to the city of Spokane and its outskirts. Beginning June 1,1993, the program will expand to new areas of King, Snohomish and Spokane counties, and will be introduced for the first time to Clark County. The program will become effective August 2, 1993 in South King and Pierce counties.

Summarized below are some of the contributions the emission check program makes to improve air quality, better your health, and enhance vehicle performance.

AIR QUALITY

Q: Does emission testing reduce air pollution?

A: Yes. The most recently available data shows that, per year, carbon monoxide emissions, our state's largest air pollution problem, are reduced by approximately 20% among vehicles inspected by the program. This represents a reduction of 43,000 tons of air pollutants! Because cars and trucks are responsible for approximately 55 percent of the state's total air pollution, emission testing significantly helps to improve air quality

HEALTH

Q: How will the emission check program protect my lungs?

A: Emission testing can help you breathe easier because it helps reduce air pollution. In general. polluted air can make healthy people cough and wheeze, while also creating more severe problems for children, the elderly, and individuals with heart or respiratory trouble.

Carbon monoxide from motor vehicles is the main component of air pollution. It can interfere with your blood's ability to carry oxygen to your brain, heart, and other areas of your body, starving your body of oxygen. Common symptoms of carbon monoxide exposure at levels such as those found in traffic include headaches, drowsiness, dizziness, lapses in concentration, irritability, and nausea.

VEHICLE PERFORMANCE

Q: How can the testing program improve the performance of my vehicle?

A: Emission testing encourages an ongoing program of preventive maintenance which results in a better performing vehicle. In general, a properly performing emission control system means the following benefits for your car or truck:

- Better **gas mileage.** A vehicle which meets emission standards is more likely to run at or near peak fuel efficiency The fuel savings from an improvement of even one to two miles per gallon can add up over the course of a year. This reduced fuel consumption represents economic, energy, and environmental savings.
- **Enhanced performance.** An emission test for a motor vehicle is similar to checking a person's pulse rate; it's a good, basic way to find out whether the subject is functioning normally Failing to meet emission standards can be an indicator of any number of problems which may be hindering a vehicle's performance. Repairing the problem often will result in improved performance.
- **Longer life span and more reliability.** Many manufacturers and mechanics recommend an emission test along with regular tune-ups for your vehicle. They know that a regularly serviced vehicle has a longer life span and will be more reliable than one which is neglected. Emission testing can be an important part of that service. It can help identify problems before expensive or irreparable damage is done. If your vehicle fails to meet emission standards while still under warranty. repairs to the emission control system are often covered.

F-AIR-93-26

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Emission Check

You're on the Road to Cleaner Air.

VEHICLES, AIR QUALITY, AND YOUR HEALTH

Q: How much do motor vehicles contribute to air pollution?

A: Cars and trucks are the prime source of air pollution in **Washington** state. Motor vehicles are responsible for 55 percent of the state's total air pollution, more than double the amount from all industrial sources. Each year, motor vehicles emit **1.4** million tons of harmful pollutants, more than all other sources combined.

Q: What types of pollutants do gasoline-fueled vehicles release?

A: The "big three" of vehicle pollutants are carbon monoxide (CO), hydrocarbons (HC), and nitrogen dioxide (NO,).

Q: How do the pollutants in vehicle emissions worsen air quality?

A: CO — Carbon monoxide poses the biggest air pollution problem in Washington state. Each year, one million tons of carbon monoxide are released into the air. In areas where air quality dips **below** federal health-based standards for carbon monoxide (nonattainment areas), motor vehicles account for up to 75 percent of the carbon monoxide emissions.

HC **and NO_3** - Hydrocarbons help make up ozone CO,), a prime ingredient in photochemical smog (not to be confused with the protective "ozone layer."). Nitrogen dioxide, reacts in the atmosphere with hydrocarbons **and sunlight to form *ground-level* ozone. Motor vehicles produce 292,000** tons of **ozone-causing pollutants each year in Washington.**

Q: Do diesel-powered vehicles pollute more than gasoline-powered vehicles?

A: It's easy to think diesel-powered vehicles pollute more than gasoline-powered vehicles because you can see the smoke. However, one doesn't necessarily pollute more than the other. The two types of fuels release different pollutants, so a straightforward comparison can't be made. Diesel-powered vehicles release small particutates or soot, while gasoline-powered vehicles primarily release carbon monoxide. The most important fact is that both types of pollutants worsen air quality and are harmful to your lungs.

Q: Aren't vehicles burning cleaner than before?

A: Yes. However, any air quality gains from cleaner fuels and improved emission control systems have been more than offset by the rapid increase in the number of vehicles on our roads. Total traffic volume in our state continues to grow at a rate faster than our population, and people are driving more miles annually. As a result, more and more pollutants are being poured into our air each year.

Q: How does air pollution affect my health?

A: Numerous scientific studies have shown **that the air pollutants** contained in motor vehicle emissions **are harmful to** humans. **In** general, polluted air can make healthy people cough and wheeze, while also creating more severe problems for young children, the elderly, and individuals with heart or respiratory trouble. Long-term exposure to air pollution has permanent effects on the ability of the lungs to function and can lead to lung disease. More specifically:

- **Carbon monoxide** interferes with your blood's ability to carry oxygen to your brain, heart, and other areas of your body, starving your body of oxygen. It most severely affects pregnant women and those with heart or lung trouble, and can be lethal at high concentrations. More common symptoms at lower carbon monoxide levels, such as those found in traffic, include headaches, drowsiness, dizziness, lapses in concentration, irritability, and nausea.
- Ozone, while not as large a problem as CO in this state, is just as bad for your body. Smoggy air inflames your lung tissues and breathing passages, decreases lung capacity, and causes coughing and **chest pains.**
- People who exercise outdoors are more vulnerable to the effects of air pollution, feeling symptoms at lower pollution levels and suffering a reduced ability to breathe. It's estimated that a daily half-hour run in a polluted urban area exposes an individual to as much carbon monoxide in the blood as smoking about a pack of cigarettes a day.

Q: What's the bottom line on air pollution in Washington?

A: Air pollution causes health problems and lost productivity costing our economy almost $ 1 billion annually. It contributes to 150 cancer cases and 100 deaths each year.

Q: Will emission testing really help reduce air pollution?

A: It will. The program has been proven to cut carbon monoxide emissions by 20 percent from tested vehicles as a group. Since testing can identify the 10 percent of the vehicles on the road that produce as much as half of all vehicle emissions, it makes a significant contribution to improving air quality.

F-AIR-93-25

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Transportation Demand Management: Commute Trip Reduction

Transportation Demand Management (TDM) programs help solve transportation-related air pollution, energy and congestion problems by promoting changes in driving behavior. TDM in Washington focuses on commute trip reduction efforts. It promotes alternatives to single-occupancy vehicles, such as transit, high-occupancy vehicle lanes, car and van pools, cycling and walking.

Through their Commute Trip Reduction programs, employers can help change commuting behavior by offering such things as flex time, ride matching, telecommuting, alternative work schedules, bicycle parking and lockers, and a "guaranteed ride home" for family emergencies or times when an employee must work late. Employers can offer incentives, including preferential parking and/or lower parking fees for car and van pools, transit passes and other transportation allowances. Disincentives, such as restricted parking or fees for parking can also be used to influence commuting decisions.

Commute Trip Reduction works!

Commute Trip Reduction programs are successfully underway in parts of California, Arizona and Maryland and are being developed and implemented in other states as well.

Commute Trip Reduction programs can work here in Washington, whether the work sites house 100, 3,000 or 13,000 employees:

- *Boeing Plant, Renton:* Only 73 percent of the employees commute in single-occupancy vehicles, compared to 87 percent in the surrounding area.
- *Swedish Hospital, Seattle:* 44 percent drive alone, compared to 59 percent at similar locations.
- *CH2M Hill, Bellevue:* 54 percent now drive alone, compared to 82 percent for similar locations.

What the new law does

Originally proposed as part of Governor Gardner's Clean Air Washington Act (ESHB 1028), this legislation was amended and adopted separately as SSHB 1671. It:

- Creates a task force representing businesses, state and local governments, the general public and transit agencies to establish guidelines for Commute Trip Reduction ordinances, plans and programs, by March 1,1992.
- Directs local governments in Clark, King, Kitsap, Pierce, Snohomish, Spokane, Thurston and Yakima counties (and others, if they wish) to adopt Commute Trip Reduction ordinances and plans by the end of 1992.
- Requires major public and private employers to adopt and implement Commute Trip Reduction programs after local jurisdictions have adopted their plans.
- Defines major employers as having 100 or more workers per site.
- Sets these goals for reductions in the number of trips made by commuters in single-occupancy vehicles: 15 percent by 1995, 25 percent by 1997 and 35 percent by 1999.

- Gives credit to firms that have adopted programs of this nature already. Those who can demonstrate they have met the goals may not need to do more.
- Establishes a state technical assistance team, composed of the Energy Office and Ecology and Transportation departments, to provide support for the task force, develop information and training materials and assist employers and local governments.
- Requires Commute Trip Reduction plans for state agencies not subject to local plans, to be developed by the Department of General Administration by summer 1993.
- Employers are required to show a good faith effort in implementing their program. Civil penalties can be levied against willful violators.

More information

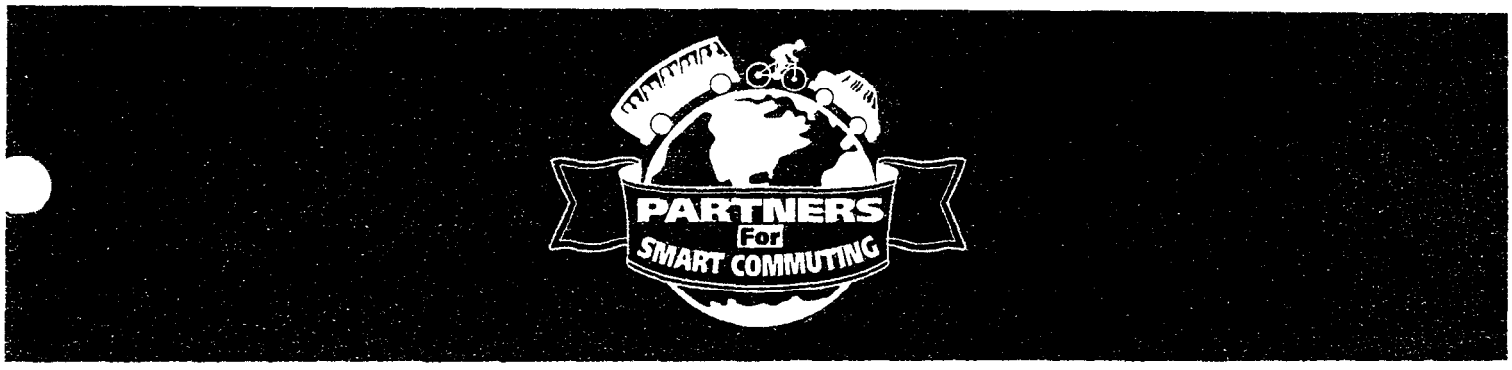
For more information on Commute Trip Reduction, contact: Kristine Burton, Washington State Energy Office, 809 Legion Way SE, P.O. Box 43165, Olympia, WA 98504-121 1; (206) 956-2062.

Ecology has prepared fact sheets on each major element of Clean Air Washington. Any or all of these are available from the Washington State Department of Ecology, P.O. Box 47600, Olympia WA 98504-7600, or call

Marcia Geidel	Commute Trip Reduction Coordinator	(360) 407-6857
Tami Dahlgren	Outreach Specialist	*(360) 407-6830*

If you have special accommodation needs or require this document in alternative format, please call Ecology's Air Quality Program at (360) 407-6830 (voice) or (360) 407-6006 (TDD only).

Washington State Department of Ecology
P.O. Box 47600
Olympia WA 98504-7600



Facts about Smart Commuting

from the Partners for Smart Commuting

- When you leave your car at home and find another way to get to work – and you convince others to do the same – you help reduce traffic congestion and air pollution, and you save energy.
- Driving causes more of the Pacific Northwest's – and the world's – air pollution than any other activity.
- In the Pacific Northwest, auto exhaust accounts for two to eleven times as much air pollution as forest slash burning and about five times as much air pollution as industry.
- If each car carried two passengers instead of only one, we could save up to 40 million gallons of gas each day.
- When just one commuter leaves the car in the garage and uses another way to get to work for one year, our lungs and planet are spared an average of eighteen pounds of hydrocarbons, 185 pounds of carbon monoxide, and nineteen pounds of nitrogen oxides. *
- For every 25 miles you drive, you add one pound of pollution to the air.
- The United States has only 5 percent of the world's population, but uses 26 percent of all commercial energy.
- Automobiles account for about 30 percent of the nation's total carbon dioxide emissions. Carbon dioxide is the main contributor to the greenhouse effect – the slow warming of the Earth's atmosphere.
- If you drive alone to work and switch to mass transit, carpool or vanpool, you can cut your commute costs by more than half. You eliminate your commute costs if you ride your bike or walk.

* based on round trip mileage of 18 miles per day

(See other side)

Clean Air and Energy-Saving Tips

- Carpool or use public transportation whenever possible.
- Avoid short trips. Link your trips together or try to use a bicycle or walk for short trips. Your car burns more than twice as much gasoline during the first few minutes of operation as it does at other times.
- Inflate your tires properly. Underinflated tires cause drag, which can raise fuel consumption as much as 6 percent.
- Limit the use of your car's air conditioner. It consumes more than a gallon of gasoline for each tankful you burn.
- Use radial tires. They can improve fuel economy by about one mile per gallon.
- When you buy a new car, choose a fuel-efficient model.
- Keep your car properly tuned.
- Have your emissions system inspected regularly.
- Replace your car's air filter every 15,000 miles.
- Drive at a steady speed.
- Slow down when traffic permits. You'll burn less gasoline at 55 mpg than at 65 mpg.
- Avoid idling. Thirty seconds of idling can consume more gasoline than the amount used to start your car.

Clean Air Washington

The Clean Air Washington Act of 1991 sets a comprehensive new course toward cleaner air throughout the state.

Alternative Motor Vehicle Fuels

The problem

Motor vehicles are Washington's largest air pollution source, accounting for more than 50 percent of the statewide total, or about 1.3 million tons of pollutants per year. The metropolitan areas in Clark, King, Pierce, Snohomish, Spokane, and Yakima counties officially exceed federal health standards for carbon monoxide, mainly because of motor vehicle pollution. Motor vehicle emission account for much of the reason why King, Pierce, Snohomish and southern Clark counties exceed federal ozone pollution standards, too. Compounding the problem is the fact that vehicle use is growing two to three times faster than the rate of increase of Washington's population.

Cleaner fuel and alternative Dower

There are several alternatives to today's gasoline and diesel fuel. These include: compressed natural gas (CNG), propane, methanol, ethanol, reformulated or oxygenated gasoline, liquefied petroleum gas, electricity, and hydrogen. There is, however, no inherently clean fuel. It is important to look at actual emissions from specific vehicles. There are vehicles available now whose emissions are below the federal standards.

Alternative fuel technologies can offer the possibility of lower emissions. To date, alternative fuels are used mainly in large, centrally fueled fleets. This is due, in part, to high costs and a lack of refueling stations and manufacturers.

School districts in Tacoma, Tumwater, Yelm, and West Valley near Spokane run buses on compressed natural gas. The cities of Enumclaw, Kirkland, and Longview use it in their municipal fleets. Compressed natural gas vehicles have been introduced into the King County motor pool. Pierce Transit plans to run its entire fleet on compressed natural gas in ten years.

Propane is used in 46 local government fleets. The North Shore School District, near Seattle, has been operating propane vehicles since 1977.

Clean Air Washington's requirements

- Required Ecology to develop specifications that define clean fuels and clean-fuel vehicles for as many types of fuel as possible by July 1, 1992.
- Requires that at least 30 percent of new vehicles purchased by the state must be "clean-fuel vehicles." This requirement increases five percent every year. Ecology and the Energy Office are looking into recommending a "fuel blind" standard that recommends cleaner vehicles,

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rather than specific "clean fuel." In this way, cars that are now available using standard gasoline, but which have low emissions, can be considered for purchase, as well as vehicles that use "alternative fuels."

- Establishes a school bus compressed natural gas advisory committee, administered by the Washington State Energy Office, to study the potential benefits, costs, and safety risks of increasing the use of CNG as a fuel for school buses. The committee submitted a report to the legislature in December 1991.
- Directs Ecology, in cooperation with other departments, to report every two years to the legislature on the clean fuel program. This report should include the effect of the program on air quality, recommendations for enhancing the distribution of clean fuels, and how much the private sector and local governments have been using clean fuels and clean-fuel vehicles.
- Requires the Utilities and Transportation commission to identify barriers to the development of CNG refueling stations and to develop policies to remove those obstacles.
- Provides for the use of air pollution control funds for matching grants to local governments that voluntarily decide to switch to clean-fuel vehicles for public transit. These grant monies may also be used to start clean-fuel vehicle mechanic certification programs at vocational-technical institutes.
- Provides funds to Western Washington University for research and development of alternative fuel and solar-powered vehicles.

For more information

Ecology has prepared fact sheets on each major element of Clean Air Washington. Any or all of these are available from the Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-7600, or call:

Tami Dahlgren, Outreach Specialist (360) 407-6830

If you have special accommodation needs or require this document in alternative format, please call Tami Dahlgren at (360) 407-6830 (voice) or (360) 407-6006 (TDD only).

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Oxygenated Gasoline

The problem

Motor vehicles are Washington's largest air pollution source, accounting for over 50 percent of the statewide total, or 1.3 million tons of pollutants a year. The metropolitan areas in Clark, King, Pierce, Snohomish and Spokane counties officially exceed federal health-based standards for carbon monoxide, mainly because of motor vehicle pollution. The carbon monoxide problem is especially bad in winter, when cold weather causes cars to be less efficient and stagnant air traps pollution close to the ground.

How does oxygenated gasoline help solve the problem?

Carbon monoxide results from the incomplete combustion of carbon-based fuels, such as gasoline. An important step toward reducing carbon monoxide emissions is the use of "oxygenates" in gasoline. An "oxygenate" is a substance that is added to gasoline to increase the amount of oxygen in the fuel blend. This increased oxygen makes the combustion process more complete, thereby reducing carbon monoxide emissions. Federally permitted oxygenates include ethanol and MTBE (methyl-tertiary-butyl ether).

Gasoline blended with ethanol or MTBE has been used successfully in motor vehicles for several years. Most drivers will not notice any difference in performance or maintenance when using oxygenated gasoline in a properly maintained vehicle.

About the oxygenated gasoline program

Oxygenated gasoline programs began in November 1992 and are required by federal law during the fall and winter in 39 metropolitan areas in the United States, including Everett-Seattle-Tacoma, Spokane and Vancouver. The Department of Ecology estimates that the use of oxygenated gasoline in these areas during the winter months reduces tailpipe carbon monoxide emissions by about 25 percent.

To meet requirements of the federal Clean Air Act, Ecology's oxygenated gasoline regulation:

- Requires the use of oxygenated fuels during colder weather months in areas that do not officially meet federal health standards for carbon monoxide. These areas are in Clark, King, Pierce, Snohomish and Spokane counties.
- Sets time periods when oxygenated fuels are required:
  - November 1 - February 29 in western Washington; and
  - September 1 - February 29 in eastern Washington.
- Requires an average oxygen content of 2.7 percent and a minimum of 2.0 percent in gasoline.
- Requires labeling at service stations using oxygenated gasoline to explain the purpose of oxygenates.

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For more information

If you would like more information on the oxygenated gasoline program, contact your local air pollution control agency listed below:

Puget Sound Air Pollution Control Agency
(King, Kitsap, Pierce, Snohomish Counties)
110 Union St., Ste. 500; Seattle, WA 98102-2038
l-800-453-4951 (Oxygenated gasoline calls only.)
(206) 343-8800 or l-800-552-3565 (All other business,)

Southwest Air Pollution Control Authority
(Clark, Cowlitz, Lewis, Skamania, Wahkiakum Counties)
1308 NE 134th St., Ste. A; Vancouver, WA 986852747
(206) 574-3058 or l-800-633-0709

Spokane County Air Pollution Control Authority
W 1101 College Ave., Ste. 403; Spokane, WA 99201
(509) 456-4727

If you have special accommodation needs, please contact the Air Quality Program, Department of Ecology, at (206) 407-6800 (voice) or (206) 407-6006 (TDD).

Washington State Department of Ecology
P.O. Box 47600
Olympia WA 98504-7600

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus

Oxygenated Gasoline
Changes to the Program

Background

The federal Clean Air Act requires oxygenated fuels to be used during colder weather months in areas that do not meet federal health-based standards for carbon monoxide. Beginning in 1992, wintertime use of oxygenated gasoline was required in Clark, King, Pierce, Snohomish and Spokane Counties. Because Clark, King, Pierce and Snohomish counties are now meeting the federal carbon monoxide standard, Ecology is proposing to eliminate the requirement for oxygenated gasoline use in these areas. Local air pollution control agencies are requesting that the Environmental Protection Agency (EPA) redesignate these areas as attainment areas, and have prepared plans for maintaining the air quality standard. Approval of the plans by EPA is expected in 1996. Each plan specifies that oxygenated gasoline may be reintroduced by local regulation if violations of the carbon monoxide standard occur.

The oxygenated gasoline requirement will remain in Spokane County, where oxygenated gasoline is still needed to control carbon monoxide.

How does oxygenated gasoline work?

Carbon monoxide results from the incomplete combustion of carbon-based fuels, such as gasoline. Adding an "oxygenate" to gasoline increases the amount of oxygen in the fuel blend. This makes the combustion process more complete, thereby reducing carbon monoxide emissions. The Department of Ecology estimates that the use of oxygenated gasoline in required areas during the winter months in 1992-93 reduced tailpipe emissions of carbon monoxide by about 25 percent.

Why is oxygenated gasoline no longer needed?

Newer cars are equipped with devices that sense the oxygen level in the fuel mix and add air as needed. As newer cars replace older ones, the fleet is becoming more efficient. In addition, the motor vehicle Emission Check Program tests car emissions and requires the proper repair of those vehicles that emit excessive air pollution. These factors have helped reduce carbon monoxide to levels that meet the federal standard.

Effects of changing the oxygenated gasoline program

Most motorists will not notice the changes in the gasoline. Because oxygenated gasoline decreases fuel efficiency by about two percent in certain vehicles, some vehicle owners may benefit slightly from the removal of the oxygenated gasoline requirement. Others may need to change their fuel filters less frequently.

The proposed changes will likely reduce costs for gasoline blenders and distributors located in the central Puget Sound and Clark County areas. Ecology estimates that eliminating the oxygenated gasoline program in western Washington will save about $39 million per year in the affected counties. These savings are in the reduced mileage, higher maintenance, production and distribution of oxygenated gasoline, and administrative costs associated with the oxygenated gasoline program.

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What happens next?

Following public hearings on the proposed changes to the program, Ecology will summarize and respond to public comments and revise the draft rule as appropriate. The final rule is scheduled for adoption in September 1996, and will become effective one month later.

For more information

Kitty Gillespie *(360) 407-6862*
Department of Ecology

If you have special accommodation needs or require this document in alternative format, please contact Tami Dahlgren at Ecology's Air Quality Program, (360) 407-6830 (voice); or (360) 407-6006 (TDD only).